NEW NEW

MPI INTRODUCES SUPER ACTION MEMORY EXPANDER BOARD FOR VIC 20*

Adds 24K and 3 Expansion Slots With Switches and Fuse $109.95

(Expandable To 35K By Simply Adding Memory Chips and Switches)

INTRODUCTORY PRICE

$109.95

Transfer Cartridges To Tape

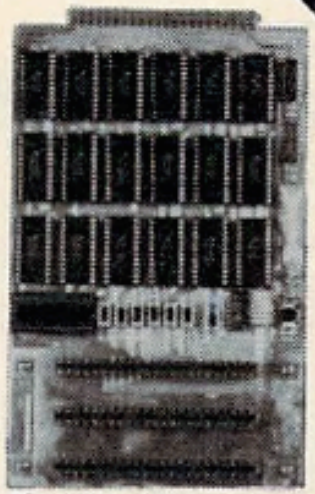
Evade Self Destruct Code With Write Protect Switch

All Boards Factory Tested

Complete Instructions And Illustrations Included.

Fuse Protected

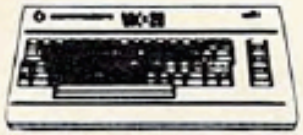
Reset Switch



Pictured Above—
Action Board with all options

24K BOARD FEATURES:

- *Adds 24K Memory (29K with VIC* 5K).
- *Upgrade Board to 35K by adding IC's and switches.
- *Memory switchable in 8K sections. (No need to remove memory board to run your other programs).
- *3 expansion slots with switches (for game or extra utility cartridges).
- *Reset button allows restarting computer without turning power off.
- *.5 amp fuse protected.
- *Switch relocates expansion cartridges in memory so that it can be saved on tape as a backup for your valuable programs. (The unexpanded VIC will not allow cartridges to be saved on tape).
- *Write protect switches allow programs stored in RAM at ROM location or entire Memory to be protected against accidental write.
- *Switch allows memory to be moved between RAM and ROM location. (Useful for developing your own games and saving on tape).
- *Gold plated card edge connector.
- *No other memory expansion needed.
- *Easily plugs into your VIC, no modifications necessary. Saves wear on your VIC 20 since board never needs to be removed or power turned off and on to run other tapes or cartridges.
- **Optional 35K memory (40K with VIC* 5K).



VIC 20* is a registered trademark of Commodore.

24K memory, 3 expansion slots, switches assembled and tested **$109.95**

Same as above with sockets that allow you to later add your own memory chips to bring memory from 24K to 35K **$124.95**

Full 35K memory, 3 expansion slots, 3K expander mode, eprom socket (switch selectable between BLK 3 & BLK 5) and all switches assembled and tested (eprom not included) **$149.95**

Bare 35K board with complete instruction and parts list **$39.95**

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MIDWEST PERIPHERAL INDUSTRIES

MPI

Add $5 for shipping and handling
Mo. residents add 5½% sales tax
Send check or money order to

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Box 8123-B
Kansas City, MO 64112

NEW NEW

MPI SUPER ACTION MEMORY EXPANDER INSTRUCTIONS

The MPI Super Action Memory Expander Board (Referred to as Memory Board) with all options, adds all the memory that the VIC can direct address. In addition three expansion connectors with power switches are provided for adding games or utility cartridges. Switches are provided which allow selection of the amount of memory added and control which of the expansion connectors are active on. A reset switch is provided which when pushed causes a cold restart of VIC (same as turning power off then on) thus, saving wear on the VIC since power is not turned off and back on to the unit. Once installed in the VIC the memory board should normally never need to be removed, since the easy to operate swiches allow selection of any amount of additional memory and selection of which expansion connectors is on. This further saves wear on the VIC, since it is not necessary to remove and install the memory board to add or take away memory. The memory board is easily installed in the VIC expansion connector just as other memory expansion or game cartridges.

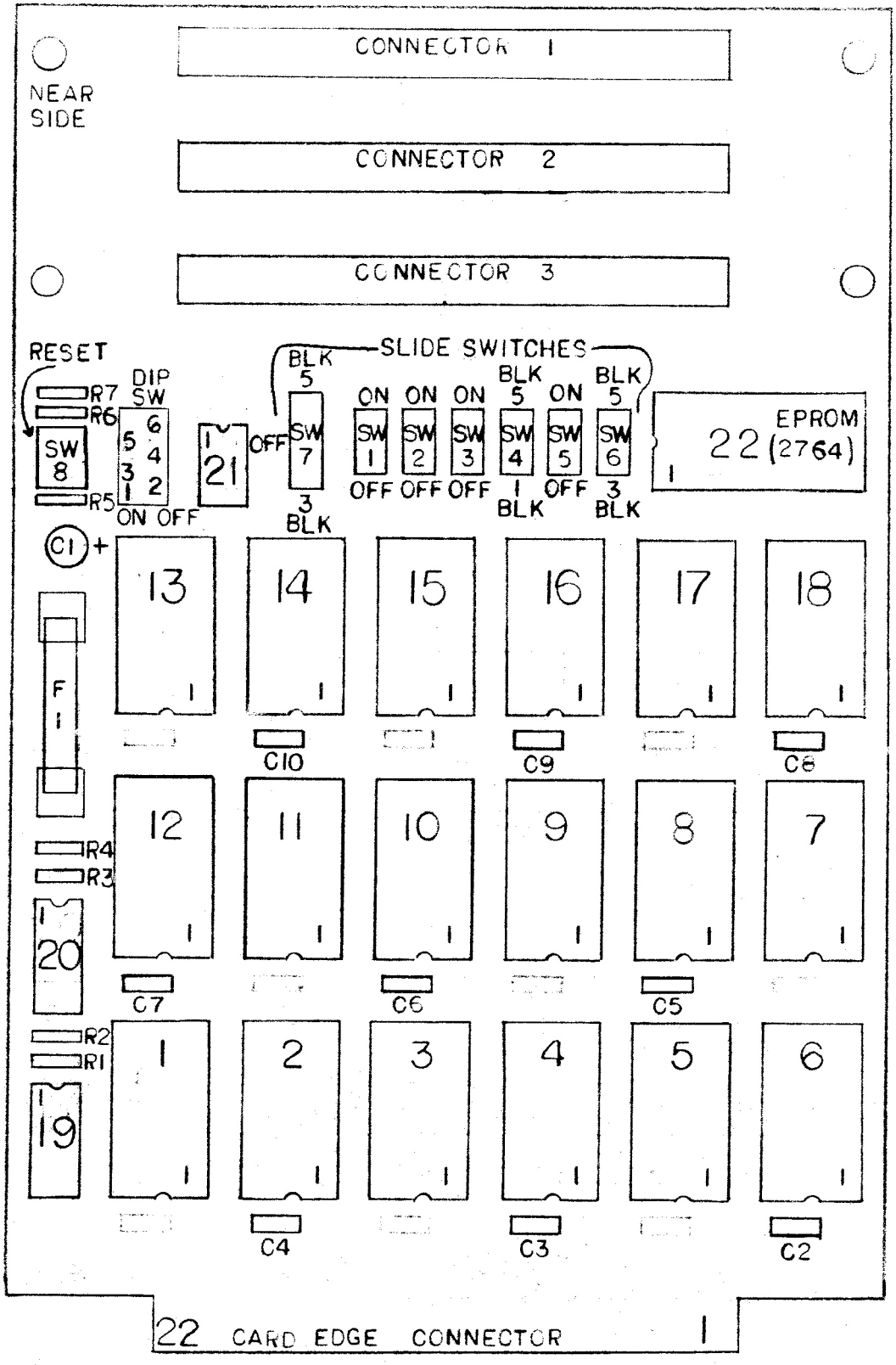
These instructions are divided into two main parts. The first part explains some of the most common uses of the memory board. (Those marked with * for optional memory). The second part explains the function of each of the switches.

Installing the Super Action Memory Expander (Memory Board).

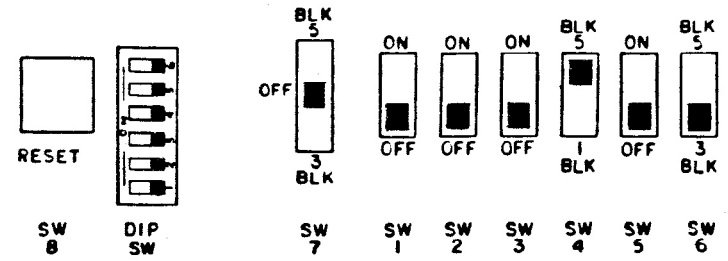
1. Turn power off to the VIC.
2. Insert the Memory Board into the Expansion connector at the back of the VIC, with the components facing up.
3. Turn power on the VIC and proceed to select the amount of memory desired (see remaining instructions).

Note (1) Whenever the amount of memory is changed or the expansion connectors are turned on or off the reset switch should be pushed in order for the VIC to recognize the changes.

Note (2) Figure 1 has been provided to show the locations of the various switches and components. Please refer to this figure before proceeding with the instructions.

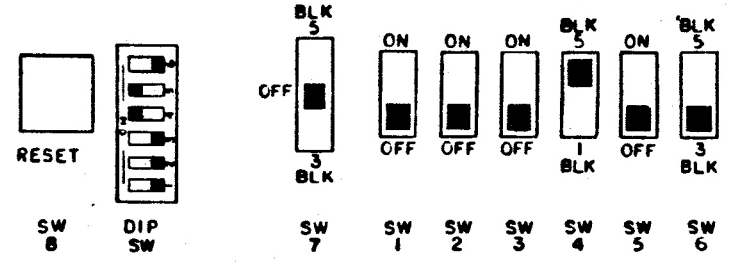


PARTS LAYOUT
FIGURE 1



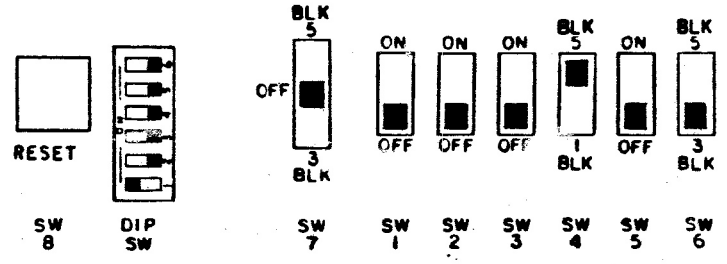
No Memory Expansion Or
Expansion Connectors On.

(1) Position switches as shown.
(2) Push RESET button.
(3) 3583 BYTES FREE displayed.



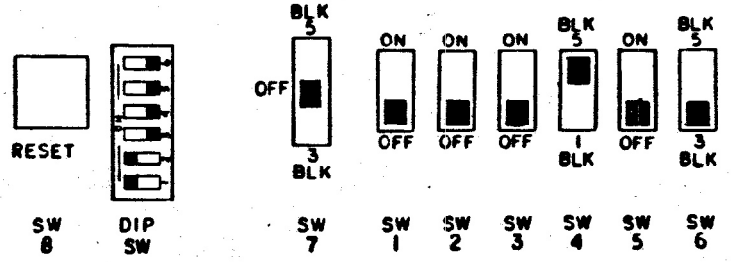
* 3K Memory Expansion

(1) Position switches as shown.
(2) Push RESET button.
(3) 6655 BYTES FREE displayed.



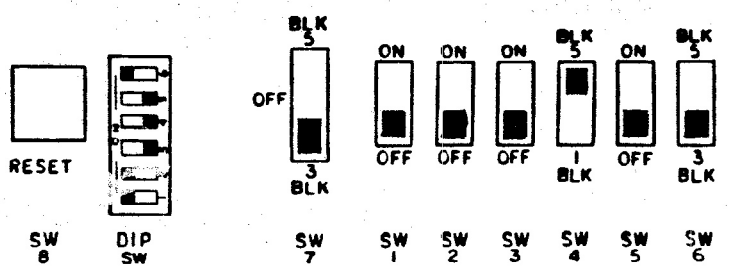
8K Memory Expansion

(1) Position switches as shown.
(2) Push RESET button.
(3) 11775 BYTES FREE displayed



16K Memory Expansion

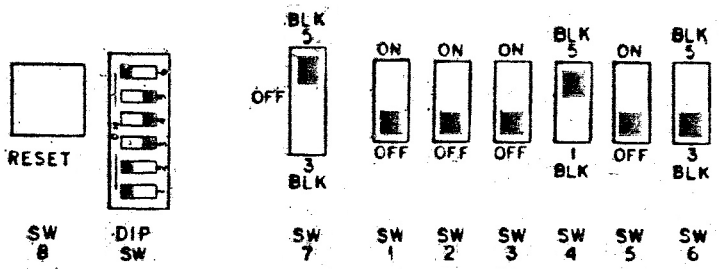
(1) Position switches as shown.
(2) Push RESET button.
(3) 19967 BYTES FREE displayed.



24K Memory Expansion

(1) Position switches as shown.
(2) Push RESET button.
(3) 28159 BYTES FREE displayed.

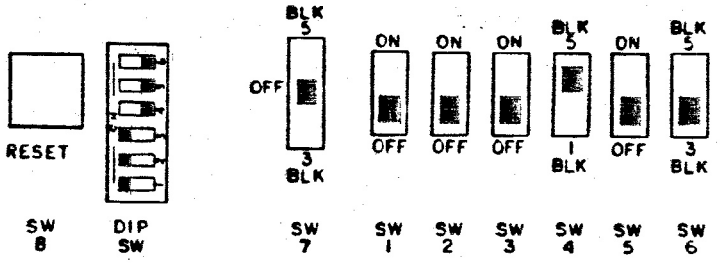
* Optional Feature



16K RAM Plus 8K RAM at ROM Location (A000 - BFFF)

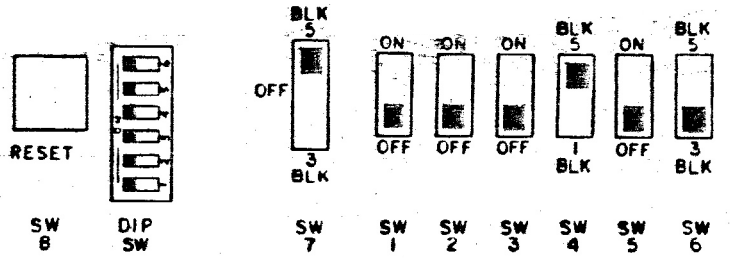
(1) Position switches as shown.
(2) Push RESET button.

Note: This made useful for developing games or machine language programs and for loading and running previously saved programs from cartridges.



*24K Memory Expansion

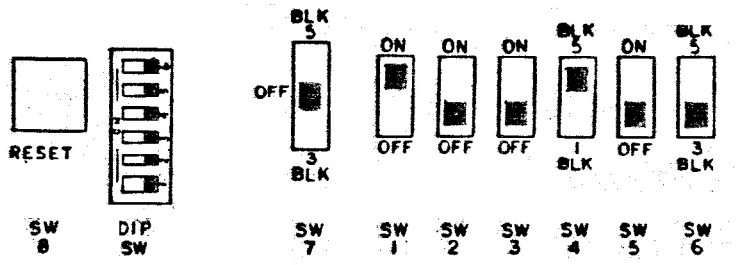
(1) Position switches as shown.
(2) Push RESET button.
(3) 28159 BYTES FREE displayed.



*35K Memory Expansion

(1) Position switches as shown.
(2) Push RESET button.
(3) 28159 BYTES FREE displayed.

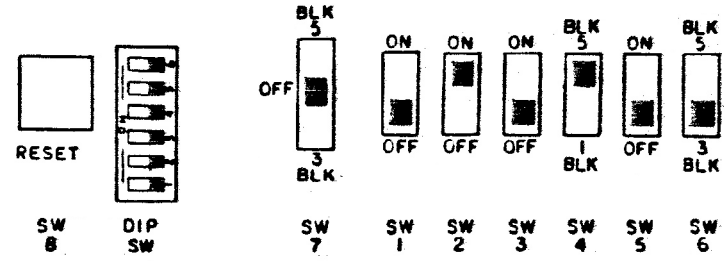
Note: Only 28159 BYTES are FREE for BASIC. The other 11K BYTES are located as follows; 3K at address (decimal 1024-4095, Hex 0400-0FFF), and 8K at address (decimal 40960-49151, Hex A000-BFFF). This 11K is not directly accessable in BASIC but is useful for data storage (Via POKES and PEEKS) or for machine language routines.



Cartridge in Connector 1

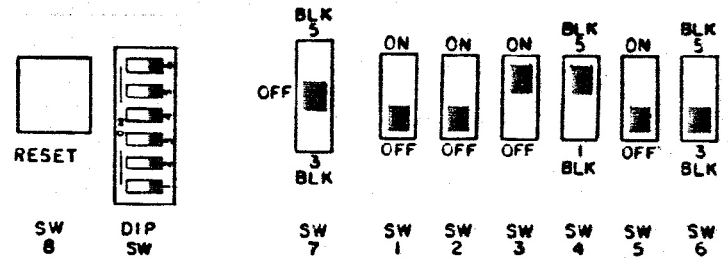
(1) Install cartridge in connector 1 with label (name) facing you.
(2) Position switches as shown.
(3) Push RESET button.

* Optional Feature



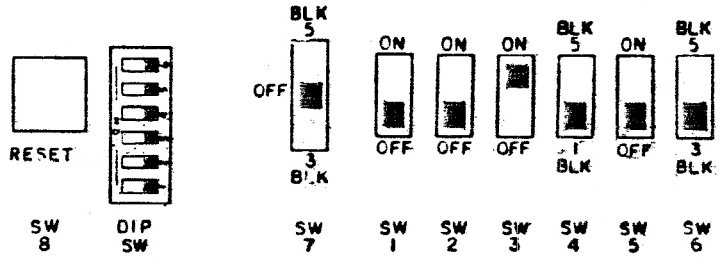
Cartridge in Connector 2

(1) Install cartridges in Connector 2 with label (Name) facing you.
(2) Position switches as shown.
(3) Push RESET button.



Cartridge in Connector 3

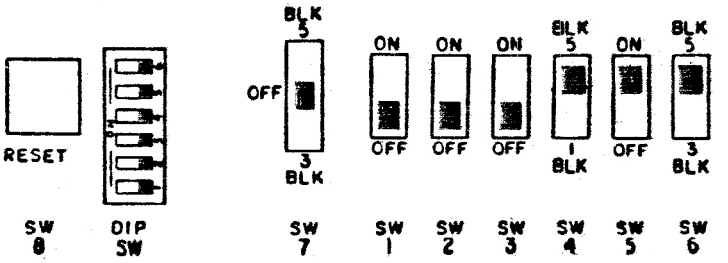
(1) Install cartridge in Connector 3 with label (Name) facing you.
(2) Position switches as shown.
(3) Push RESET button.



NOTE: See Example on Pages 6 and 7.

Saving Cartridge On Tape

(1) Install cartridge in Connector 3 with label (Name) facing you.
(2) Position switches as shown.
(3) Push RESET button.
(4) Save on tape from memory location 8192 - 16383 using machine language save programs such as Tinymon or VIC Block Save and Load (See Compute; Dec. 1982).



* EPROM Programs

(1) Install EPROM (2764) with pin one in lower left corner of socket or install 2732 with pin one in pin three of socket.
(Note; 2732 will be addressed in both lower (4K) half and upper (4K) half of 8K memory block).
(2) Position switches as shown for EPROM in block 5.
(Note; For operation in block 3 move switch 6 to lower position).
(3) Push RESET button.

* Optional Feature

EXAMPLE of Saving Cartridge on Tape and Loading from Tape to Memory.

The following example shows how to save a program from a cartridge to tape and how to load a program from tape to memory. The program used in this example is the "VIC BLOCK SAVE AND LOAD." This program appeared in the December 1982 issue of "Compute" magazine (referred to as Dump/Recover). While this example is based on the Dump/Recover program, other programs may be used in a similar manner.

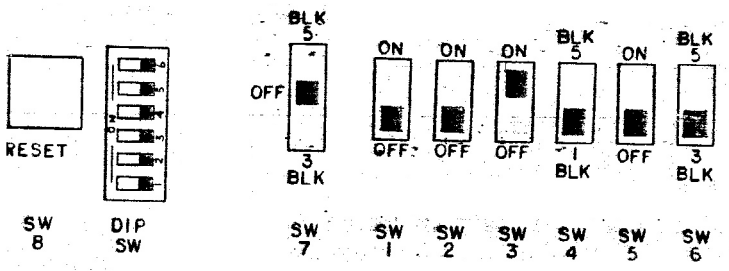
Caution: Many purchased cartridges are copyrighted and may not be copied.

Note: The following method only works for saving cartridges that are at address decimal 40960-49151 (Hex A000-BFFF). The VIC will not normally allow saving this area of memory. Your MPI Memory Board overcomes this. Cartridges that appear in other areas of memory may be saved without use of this example.

Saving Cartridges to Tape

1. Turn power off to the VIC and install cartridge in connector #3 with label (name) facing you.

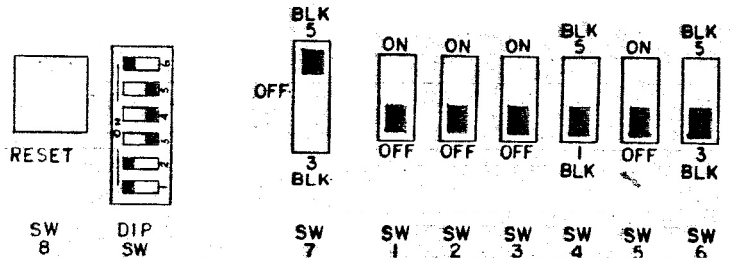
2. Position switches as shown in the figure below:



3. Turn VIC power on.
4. "3583" BYTES FREE displayed.
5. Load Dump/Recover program (from tape previously saved).
6. Install blank tape for saving cartridge.
7. "RUN" Dump/Recover program.
8. Enter 8192 for start
   Enter 16383 for end
   Enter name of your choice for name
   Push return when ready to start load.

Loading Tape to Memory (Decimal 40960 - 49151, Hex A000 - BFFF)

1. Turn VIC on.
2. Position switches as shown in the figure below and press reset.



3. "19967 BYTES FREE" displayed.
4. Load Dump/Recover program (from tape previously saved).
5. Install tape to be loaded.
6. "RUN" Dump/Recover program.
7. Enter 40960 for start
   Enter 0 for end
   Enter name of previously saved program for name
   Push return to load program.
8. When VIC completes loading program move Dip Sw. 6 to the left (Write protects program just loaded in RAM).
9. Push reset button to run your program.

GENERAL HINTS AND CAUTIONS

Always make sure VIC is off when installing a Memory Board or installing cartridges in a Memory Board.

Avoid touching the metal contacts on the edge card connector. (The connector that is installed in the VIC).

Do not drop the Memory Board.

More than one Expansion connector may be on at one time, however, make certain that they do not occupy the same address and that they do not try to run at the same time.

Make certain that the same area in memory is not used at the same time. Such as a game or Connectors 1, 2, 3, and RAM memory in Block 5 (switch 7 in upper position); or connector 3 on (switch 3 upper position) and switch 4 in lower position while Dip switch 1 is on; or EPROM switch 5 on and 6 in upper position while one of the expansion connectors is on etc.

Any time memory is changed, push RESET button.

Both Dip switches 4 and 5 must be on (3K) or off.

SWITCH OPERATIONS (Refer to Figure 1)

Sw. 8 - RESET switch, causes computer to perform "cold start" of system. (As if you were turning the machine on and off, except that memory above BASIC programming is retained).

Dip Switches:

(Any one of the first Five 1,2,3,4,5 Dip Switches turned off, to the right, results in loss of that area of memory).

Dip 1 On, (to the left) adds block #1 or first 8K (dec. address 8192 - 16383 or hex address $2000 - $3FFF).

Dip 2 On, (to the left) adds block #2 or second 8K (dec. address 16384 - 24575 or hex address $4000 - $5FFF).

**********D#3,#4, #5 not used on 24K board*****

*Dip 3 On, (to the left) adds block #3 or third 8K (dec. address 24576 - 32767 or hex address $6000 - $7FFF).
Note: If this switch is on SLIDE SWITCH #7 should not be in the lower position (Otherwise double memory addressing will occur in block #3).

*Dip 4,5 On, (both must be on simultaneously), adds 3K RAM memory at decimal address 1024 - 4095 (hex $0400 - $0FFF).
Note: Both switches must be on or off <u>together</u>.

Dip 6 On (to the left) write enables third 8K block (see also SLIDE SWITCH #7). Off (to the right) write protects third 8K block of memory.

SLIDE SWITCHES:

Sw. 7 Three way switch controls location of third 8K block of RAM memory. When the switch is in the center position, third 8K memory block is off. Switching to lower position locates third 8K memory block at decimal address 24576 -32767, (hex $6000 - $7FFF). Switching to upper position locates 8K of RAM at normal ROM memory location or block five (decimal address 40960 -49151, hex $A000- $BFFF).
Note: DIP SWITCH #6 controls write enable-disable function to this area of memory.

Sw. 1 When in upper position turns power on to cartridge connector #1, (example....game cartridge on connector #1 can now be played by pushing Sw. 8 RESET SWITCH). When in lower position, power is off to cartridge connector #1.

* Denotes Optional Feature

Sw. 2 When in Upper position turns power on to cartridge connector #2, (example...game cartridge on connector #2 can now be played by pushing Sw. 8 RESET SWITCH). When in lower position, power is off to cartridge connector #2.

Sw. 3 When in Upper position turns power on to cartridge connector #3 (Example...game cartridge on connector #3 can now be played by pushing Sw. 8 RESET SWITCH). When in lower position, power is off to cartridge connector #3. Note: Sw. 4 should be in Upper position for Sw.3 to operate normally.

Sw. 4 This switch works in conjunction with Sw. 3 and cartridge connector #3. When in Upper position, cartridge connector #3 memory is addressed at decimal 40960 - 49151 (hex $A000 - $BFFF). This is the normal position for this Switch when Sw. 3 is in the upper position also.

****

Explanation of Sw. 4 being in Lower position while Sw. 3 is in the upper position...When Sw. 3 is in upper position and Sw. 4 is in Lower position, cartridge connector #3 memory address location is now transferred from decimal 40960 - 49151 (hex $A000--$BFFF) to 8K block #1 (decimal 8192 - 16383 or hex $2000 - $3FFF). This allows any program material normally stored at decimal address 40960 - 49151 (hex $A000 - $BFFF) to be loaded from or saved to tape via machine language monitor or "memory dump-recover type program") to or from 8K block #1 or decimal 8192 - 16383 (hex $2000 - $3FFF). A Vic-20 will not normally allow any memory above decimal address 40960 (hex $A000) to be saved to tape. This switching combination allows you to overcome previous VIC-20 high memory tape save limitations.
Note: When Sw. 4 is in the Lower position, Dip 1 should be in the off position or to the right. (Otherwise double-memory addressing occurs).

****

*Sw. 5 When in Upper position, turns power on to EPROM. When in Lower position, turns power off to EPROM. (Also see Sw. 6 below).

*Sw. 6 When in Upper position, (note: Sw. 5 must be in Upper position as well), EPROM memory address is decimal 40960 - 49151 (hex $A000 - $BFFF).
When in Lower position EPROM memory address is decimal 24576 32767 (hex $6000 - $7FFF).

*Denotes Optional Feature

PARTS LIST

	DESCRIPTION	QUANTITY
(1)	1-18 2K x 8 Static Ram Hatachi HM6116-P-4 (or) Mitsubishi M58725P	18
(2)	19 and 20 Dual 2 Line to 4 Line Decoder 74LS139	2
(3)	21 And Gate 74LS00	1
(4)	22 28 Pin Socket Digi-Key C8928 (or Equiv.)	1
(5)	Connector 1, 2, 3 Jameco Electronics 22/44 PC	3
(6)	Switches 1-6 SPDT Alcoswitch Model SLS-121-PC	6
(7)	Switch 7 SPDT Center Off Alcoswitch Model SLS-131-PC	1
(8)	Dip Switch 6 position Digi-Key SW1016-ND	1
(9)	Pushbutton Switch 8 Digi-Key P9952	1
(10)	C1 Capacitor 22uFD 10V Digi-Key P6606	1
(11)	C2-C10 Capacitors .01uFD 25V Digi-Key P4300	9
(12)	R1-R7 Resistor 10K 5% $\frac{1}{4}$W Digi-Key 10KQ	7
(13)	F1 Fuse .5A 3AG Digi-Key F112-ND	1
	Digi-Key F112-ND	
(14)	Fuse Clip Digi-Key F071-ND	2
(15)	Spacer 5/8" 4-40 E.F. Johnson 313-2477-020	4
(16)	Screw 4-40 $\frac{1}{4}$" G.C. Electronics 11-564-C	4
(17)	24 Pin IC Socket Digi-Key C8924 (or Equiv.)	18
(18)	Printed Circuit Board MPI P/N 0020	1